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Title	Are women with disability and multimorbidity being screened for cervical cancer? A retrospective cohort study in Ontario, Canada
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Reviewer 1	Innie Chen
Institution	University of Ottawa, Obstetrics and Gynaecology
General comments	<p>Well written with appropriate cohort selection and description of analysis. One limitation is the inclusion of women who have never been sexually active as a potential source of bias. It is likely that women with disabilities - especially if congenital - are less likely to be sexually active.</p> <p>First sentence of discussion makes conclusions beyond what is shown in the study. Please revise to reflect study findings.</p> <p>Consider exploring the types of disabilities, as mental versus physical disabilities would be expected to have different considerations with respect to screening.</p>
Reviewer 2	Waseem Sharieff MD PhD FRCPC
Institution	McMaster University, Radiation Oncology
General comments	<p>The authors use large administrative database to examine the effect of activity limitation and chronic diseases on cervical cancer screening in Ontario. They conclude that women with chronic diseases may be neglected when screening interventions are considered.</p> <p>I have the following major comments:</p> <p>The authors used multiple sources of data. Each database contains anonymous data. The authors should describe how these data were linked. Did they have a common identifier?</p> <p>The authors define level of morbidity by the number of chronic diseases. They define level of disability by the level of activity. Both these definitions are arbitrary. It might be better not to use the terms morbidity and disability and simply report the original conditions.</p> <p>The authors do not define other measures such as physician visits and hospitalizations. Did they count number of physician visits for each individual and then take the mean? Did they calculate number of days of hospitalization of each individual and then take the mean?</p> <p>The authors do not report what statistical methods were used and what comparisons were made.</p> <p>The tables are difficult to make sense of. The authors should organize results by group comparison (screened and unscreened).</p> <p>Not sure why they grouped divorced and widowed separately. Table 3 could be better displayed as a forest plot. Test of interaction is poorly described. The authors should re-word it...the effect of chronic disease on screening varied by activity limitation. The authors should consider examining geographic variation on screening. The authors should include power calculations. The authors should specify the statistical tests associated with p values (reported in tables).</p> <p>Minor comments:</p> <p>The manuscript needs significant language editing.</p> <p>Waseem Sharieff MD PhD FRCPC Cape Breton Cancer Centre Sydney NS</p>
Author response	<p>Reviewer 1:</p> <p>Comments to the Author</p> <p>1. Well written with appropriate cohort selection and description of analysis. One limitation is the inclusion of women who have never been sexually active as a potential source of bias. It is likely that women with disabilities - especially if congenital - are less likely to be sexually active.</p> <p>We thank the reviewer for this feedback. We have noted the issue of sexual activity in the limitations section of the Interpretation. Of note, approximately three-quarters of the women with disability were married, in a common-law relationship, divorced or separated. Ontario cervical</p>

screening guidelines state that women who have ever participated in any vaginal sexual activity should be screened, not just those who have had sexual intercourse, suggesting that many of these women were indeed eligible for screening.

2. First sentence of discussion makes conclusions beyond what is shown in the study. Please revise to reflect study findings.

The first sentence of the Interpretation states that we found women with disability to have lower income and less education, and to be less likely to have marital or common-law supports. This sentence is based on our findings noted in Table 1. We have re-worded the sentence to emphasize that we are referring specifically to our study population.

3. Consider exploring the types of disabilities, as mental versus physical disabilities would be expected to have different considerations with respect to screening.

We agree with the reviewer that types of disabilities would be interesting to explore. However, it is not possible to distinguish between mental and physical disabilities with available data. We have added this as a limitation.

Reviewer 2:

Comments to the Author

The authors use large administrative database to examine the effect of activity limitation and chronic diseases on cervical cancer screening in Ontario. They conclude that women with chronic diseases may be neglected when screening interventions are considered.

I have the following major comments:

1. The authors used multiple sources of data. Each database contains anonymous data. The authors should describe how these data were linked. Did they have a common identifier?

The study population was drawn from respondents to the Canadian Community Health Survey who agreed to have their responses linked with their personal health information. Their responses were then linked to the administrative databases noted in the study by a unique anonymized identifying number. This information is noted in the Methods section of the manuscript, specifically in the sections entitled Data Sources and Study Population.

2. The authors define level of morbidity by the number of chronic diseases. They define level of disability by the level of activity. Both these definitions are arbitrary. It might be better not to use the terms morbidity and disability and simply report the original conditions.

Multi-morbidity is defined in the literature as the presence of two or more chronic conditions, and we have now included a reference for this definition in the manuscript. For ease of readability, we **therefore thought it appropriate to define the presence of no and one chronic conditions as "level of morbidity"**.

Per Statistics Canada, having a disability is defined as having one's everyday activities limited because of a physical or mental condition or because of a health problem. Therefore, to measure disability, we used the Participation and Activity Limitation items of the CCHS. These CCHS items are a modification of the Statistics Canada Participation and Activity Limitation Survey (PALS), which is designed to collect information on adults and children who have a disability and uses the World Health Organization's framework of disability.

We have updated the Limitations section of the manuscript to reflect that the definitions we used are not standardized.

3. The authors do not define other measures such as physician visits and hospitalizations. Did they count number of physician visits for each individual and then take the mean? Did they calculate number of days of hospitalization of each individual and then take the mean?

For each individual in the study, we counted the number of physician visits and hospitalizations. This has now been clarified in the manuscript. In Table 1, we report the mean number of visits/hospitalizations as well as the standard deviation.

4. The authors do not report what statistical methods were used and what comparisons were made.

For this study, we used descriptive statistics to describe demographics of the study cohort. We also conducted parametric and non-parametric bivariate analyses. Specifically, differences between

disability groups were examined using chi-square tests for categorical and binary demographic variables, and t-tests and Kruskal-Wallis tests were used to examine differences in age and health system contact. All statistical tests were performed at the 5% level of significance, two-sided, using SAS for Unix, version 9.1.3 (SAS Institute, Cary, NC). We employed multivariate logistic regression to examine differences in cervical screening rates between groups as detailed in Figure 2. Predictor variables included household income, age as a continuous variable, education, rurality, marital status, and level of morbidity, and level of disability. This information appears in the Methods section of the paper.

5. The tables are difficult to make sense of. The authors should organize results by group comparison (screened and unscreened).

We appreciate the reviewer's suggestion. However, as the focus of the study was on women with and without disability, we feel that it is most appropriate for Table 1 (demographics table) and Table 2 (screening for women with and without disability by sociodemographic characteristics) to be organized by disability categorization.

6. Not sure why they grouped divorced and widowed separately.

Widowed/single and divorced/separated are categorizations used on the Canadian Community Health Survey. It is feasible that women who are widowed/single may have less social support than women who are divorced/separated.

7. Table 3 could be better displayed as a forest plot.

We appreciate this suggestion. Table 3 has now been turned into a forest plot and designated as Figure 2.

8. Test of interaction is poorly described. The authors should re-**word it...the** effect of chronic disease on screening varied by activity limitation.

In the Results section, the description of the interaction results has been re-worded for clarity.

9. The authors should consider examining geographic variation on screening.

To examine geography, we used the Rurality Index of Ontario. This index classifies individuals as living in small urban, large urban or rural areas. Results based on this index are noted in Table 2 and Figure 2. We agree that a more thorough analysis of geographic variation would be of interest but it is outside the scope of the current paper.

10. The authors should include power calculations.

The study population consists of all Canadian Community Health Survey respondents who met our eligibility criteria, and consisted of a very large sample of 22 824 women. We included 95% confidence intervals and/or p-values for all values and comparisons. Therefore, we did not feel it necessary to include power calculations, especially considering the requirement to stay within the specified word count.

11. The authors should specify the statistical tests associated with p values (reported in tables).

We conducted parametric and non-parametric bivariate analyses. All statistical tests were performed at the 5% level of significance, two-sided, using SAS for Unix, version 9.1.3 (SAS Institute, Cary, NC). The p-values in **Table 1 and Table 2 represent the comparisons of the "yes disability" and "no disability" groups using chi-squared tests for categorical and binary variables.** A t-test was performed to examine age differences between the disability groups and Kruskal-Wallis tests were performed for investigating differences in health system contact variables.

Minor comments:

The manuscript needs significant language editing.

The manuscript has been copy-edited, as well as shortened to 2500 words.